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LAYING THE FOUNDATION OF TEACHING IN DIGITAL ERA: WHAT HAPPENS TO TEACHERS WHEN TECHNOLOGY CHANGES RAPIDLY

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Abstract: Teachers may not always obtain professional training to improve themselves. Frequently, they have to learn by themselves, explore ways by their own, and do some trials and errors. They can be successful or fail. They have to do their own learning journey. This frequently happens when teachers have to work with ICT. The flourish, popularity and reputation of ICT in education seem very appealing, but at the same time provide new challenges. The Interactivity, creativity, affection, cognition, speed and transferability features of ICT may tempt teachers to use it in their teaching. However, teachers may face difficulty when they have to change by adopting new technology, but they do not know what to do, where to start and who can or will happily help them, especially when other teachers are busy with their own works. This indicates that the coming of ICT bring joy, but also difficulty for teachers. This ICT learning difficulties/challenges are heightened by the nature of ICT which changes and expands rapidly. In this study, I intend to express my reflection on my own teaching practice and my analysis on one of my colleagues teaching experience in our ICT self-learning: what issues we encounter, what we obtain and miss in our learning journey, and what aspects affect our learning. We find that professional help for teachers does not always come when it is needed. There are many times when teachers should face their teaching field independently (without professional training). However, we find that embedding ICT into teaching-learning now becomes not only a trend, but also a need. To do this, teachers should be explorative, adaptive and reflective learners. There are many challenges that we have to face during the learning process which relate to teacher, students and environment aspects which require us to do exploratory, experiential and social learning. Genuine learning may come from self-learning on what we need in our teaching practice and observation on what environment provides or not provide for our learning.

Keywords: ICT, self-learning, learning journey, professional training, learning challenges, reflection, social learning, exploratory learning and experiential learning

1. INTRODUCTION

The twenty-first century brings about significant shift in the area of education. The wider access to earn information, diffusion or distribute knowledge, communicate and share thinking, ideas and feeling occur. This circumstance is sustained and supported by ICT. It is widely recognized that ICT brings positive and constructive impacts. It allows students to explore a lot of and wide information independently and actively. It encourages students to be creative and excite to learn. For teachers, ICT also enables them to increase their knowledge and update information rapidly. It also helps teachers to manage their teaching and learning process: delivering their materials efficiently and effectively, monitoring their students' learning activity, providing facility/tools for evaluating process, and helping teachers to prepare teaching and learning materials. ICT encourages teachers and students to develop not only their cognition, but also emotion and psychomotor. It can stimulate students and teachers to be more active, independent, creative, responsible, challenged, fun, excited and enjoyable in teaching and learning process. ICT can bring education from traditional era into constructivist period which allows students to become independent learners by performing explorative and lifelong learning instead of just waiting for teachers to transfer or supply information for them.

ICT may attract teachers to use it. The potential benefits of implementing ICT in teaching and learning may tempt them to try to implement it. Some teachers may feel encouraged after seeing and observing successful experiences of other teachers when they use ICT. Other teachers can be the prototypes of teachers who are very pleased and

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welcome the coming of new technology, having open-minded behaviour, being curious on what the new ICT can do and try it. Other teachers start using it because they feel they need it. Beforehand, they may scan the learning situation, their students' need and their own necessity. Other teachers may simply implement ICT because it is what curriculum (new policy) says. This implies that ICT be teachers' "friends" to put educational reform perspective into actual practice. However, in its real practice, ICT can turn itself from teachers' "friends" into their "disasters."

The attractive power of ICT may influence teachers to use it in their teaching. It also can permeate into curriculum or school policy/regulation which forces teachers to implement it no matter whether they are ready or not. Some teachers can learn ICT successfully by using their own ways, but some of them may be left behind. Formal training may not always come immediately or regularly to help teachers. They have to perform self-study and become successful or fail. This study aims to explore how one of my colleagues and I should learn to adapt to the rapid changes of ICT. This is based on my reflection on what we have done and felt.

There are several issues which I explore and learn from our experiences. Those are:

1. What challenges did we find during our self-study and what types of learning should we have performed?
2. What happened to us or what we felt during our self study and what we looked outside and inside of our selves?

1.1. ICT in Education

In the education sector, ICT plays significant roles in facilitating educational reform. It becomes one of the agents of change (Amin, n.d.). Now, it is not only tooling, but also permeates into process of giving instruction, materials, and becoming part of curriculum (Ginsburg, n.d.). It can add parts in curriculum, improve the quality of curriculum, and encourage rising of curriculum (Scrimshaw, 2004). Some teachers may use ICT as part of their teaching, as hidden and emergent curriculum. ICT provides the foundation for teachers and students to shift their role within their learning process. ICT affects not only the classroom facility, but also classroom tangible and intangible elements, such as "classroom structure, grouping, learning tasks, interaction patterns, behavioural control, mental effort, interaction, time schedule, teaching and learning method" (Smeets, Mooij, Bamps, Bartolomé, Lowyck, Redmond & Steffens, n.d.). Teachers no longer become presenters of information all times (Amin, n.d., p.3), but they are now moving into facilitators (Petty, 2009) as mediators instead of controller (Forsyth, 1996, p. 3, cited in Wheeler, 2000). This is as stated by Karthikeyan (2013, p.3) "the "teachers" and "students" role is transformed as student become self-learner, knowledge manager and learn to be cooperative and teachers being instructional designer, leaders, facilitator, coordinating various activities." These shifting roles bring several implications on teachers and students learning methods.

The vigorous grow of ICT redirects the focus/objective of learning. In the past, educators highly concentrate on result or content of learners, but today educators focus on learners' competency, their skills to explore information and use gathered information (Amin, n.d). ICT can support these demands. It can support learners to be independent learners in gathering and practising information. As mentioned by Wheeler (2000), ICT allows learners to obtain, alter, retain, recall information and offer alternatives for learners to select their own approaches/ways in learning.

1.2 The 21st Century Teachers and ICT

The 21st century teachers are different from past period. Today's teachers should be more than transferring knowledge, but they should occupy various tasks of choosing materials, media, teaching methods, evaluations, managing time, classroom, working with students, interacting with them, observing students' advancement, accomplishing teaching and learning objectives, and fulfilling students' educational needs (Smeets, Mooij, Bamps, Bartolomé, Lowyck, Redmond & Steffans, 1999, pp. 7-8). The proliferation and diffusion of ICT into education intensify teachers' role. They should be ready for changes. Recent teachers tend to face external forces to integrate ICT in their teaching (Oubenaissa-Giardina & Bhattacharya, 2007). They should be able to adapt and work with ICT because several past/previous learning media will no longer exist

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and be replaced by newer ones, ICT will make assessment process more effectively done by teachers. Teachers should no longer just impart knowledge, but they should teach their students how to learn, and teachers should be able to fulfil learning needs of their students and follow curriculum (Wheeler, 2000). Therefore, it is significant for teachers to integrate ICT in their learning and teaching.

To be able to successfully incorporate ICT in their learning and teaching process, teachers should make some preparation and take into account several aspects. Before implementing ICT, teachers need to make planning relating to students, curriculum, and classroom condition, objectives of schools and experiences of teachers (Brophy, 1982, cited in Tubin & Edri, 2004). This planning is very vital for teachers since well preparation can decrease the happenings of unpredictable situation, enhance productivity, reinforce and sustain the implementation (Bell, 2002, cited in Tubin & Edri, 2004). It is expected that the reduced anxiety will increase teachers' motivation/willingness to use ICT. This is because teachers' lack of motivation and confidence can inhibit the ICT integration process in classroom (Haydn & Barton, 2008). In spite of the importance of planning, teachers frequently do not have time or they only have limited time to learn and plan to implement ICT (Haydn & Barton, 2008, p. 442). This indicates that teachers have significant roles in the diffusion of ICT in education.

As active agents of changing in education, teachers should be able to manage ICT. There are several requirements which should be fulfilled by teachers to be able to successfully integrate ICT: they should be sure that ICT will not disturb their teaching, be certain that ICT will assist them to teach more effectively and efficiently, and they are certain that they can handle the technology they use (Amin, n.d.). It shows that teachers' inner/self-condition can affect the potential uses of ICT. This also implies that ICT can improve learning, but there are several aspects should be handled to ensure its positive function (Higgins, n.d., p.5).

When teachers want to implement ICT, they should take into account several factors and manage ICT implementation barriers. Many researches in the area of ICT in education find that teacher factor can be very impactful. Teachers will not successfully implement ICT if they are lack of self-confidence, they displease because of IT resources/facilities, when they feel that ICT is not exciting and when they encounter problems in using it (Cox, Preston & Cox, 1999).

The significant role of teachers is highlighted by Gulbahar and Guven (2008) by proposing that only confident teachers who love searching new chances to improve their teaching and learning practices. Several researchers identify several factors beyond teachers' aspects. Karthikeyan (2013) lists several obstacles which may impede ICT implementation: teacher competencies, attitude, funds, trained personnel, language, time, infrastructure, persistent revision of courses and training platforms. Other barriers which should be tackled to diffuse ICT is relating to the fitness of ICT into curriculum, the match between ICT and course materials, lack of technical and pedagogical support, several school barriers including school policy, access and availability to hardware, and learning environments, and several teachers barriers, including teachers' belief and teachers' skills (Smeets, Mooij, Bamps, Bartolomé, Lowyck, Redmond & Steffans, 1999). Gulbahar and Guven (2008) argue that productive use of ICT depends on sustainable or continuous support for teachers. Pedagogy and learning approach should be revised to enable ICT integration into learning (Kasim, 2002). Thus, there are several factors teachers should handle while working with ICT.

3 RESEARCH METHOD

In this study, I adopt case study method based on my and one of my colleague experiences. As mentioned by de Freitas and Oliver (2006, p. 3), professionals may expand their knowledge through their work practice/experience. What we do and feel during our own teaching and learning can lead to deep understanding. Brookfield (1995, p. 32) states "analyzing our autobiographies as learners are felt at a visceral, emotional level that is much deeper than that of reason. The insights and meanings for teaching that we draw from these deep experiences are likely to have a profound and long-lasting influence. They certainly affect us more powerfully than methods or injunctions that we learn from textbooks or hear from superiors." Reflection can be done through four ways: life-stories, students' lenses, colleagues'

ISSN: 2502-4124

activities and theoretical references (Brookfield, 1995, pp. 29-30). Thus, this study adopts phenomenology as its epistemology to search knowledge. The figure below represents the method of the study.

4 FINDINGS AND DISCUSSION

4.1 Holistic Learning

From our experience in implementing ICT, I find that there are several types and process of learning which we should perform to make ICT our "friends" instead of becoming our "enemies." Within (during) the process, we encounter several challenges which I identify after performing reflection on our weaknesses. Based on that analysis, there are several challenges on implementing ICT which can be tackled by performing integrative learning and challenges identification and anticipation for future ICT application. In this discussion, I cover two main aspects: integrative learning which is required to learn ICT and challenges of implementing ICT. Within the integrative learning discussion, I elaborate my experiences and recommendations on several suggested learning for integrating ICT. Within the challenges section, I present issues/difficulties we encounter during the implementation process.

4.1.1 Integrative Learning

I find that to apply ICT in my learning and teaching, I need to perform not only learning, but also integrative acquisition. Even though when I apply ICT, I still do not understand what types of learning process I should undertake, but after performing final analysis by looking back into past experiences, I identify that there are several learning that should be performed to ensure successful application. Failure in implementing ICT stimulates me to look at what are missing and compare it to my colleagues experience in implementing ICT.

The exploratory learning is obviously essential to find the proper technology which should be implemented. This 21st century is flooded by technology, but I am aware that I cannot put all of them in classroom. Thus, selecting process is central. Within this 'picking-up' process, it is essential to fit the potential ICT with available facility, students' demands, teachers' capacity and curriculum (policy). This information seeking process tends to be context-dependent since it is affected by several factors: including human factors, their cultural and cognition situation (Brajnik, 1999, p.2). Exploratory learning is also required to expand teachers' knowledge during the implementation process. Exploration is one of several ways to learn (Rieman & Young, 1996, p. 744). I am aware that during the implementation process, affection/feeling of afraid of making mistake and messing everything is growing to be more intense. Thus, one of the biggest challenges in implementing ICT is handling teachers' emotion. Failure to handle emotion (panic, anxiety) may inhibit successful implementation.

Experiential learning is also required to implement ICT. Through this learning, teachers may absorb information from experience or by doing or learning from action. To be able to use ICT, obviously teachers need to engage with concrete experience, through active experimentation by clicking here and there. Experiencing or by engaging in active experimentation may make process of understanding ICT easier than just reading from manual of operation. This is because by practicing, learners can learn the process instead of only the result (outcome) (Kolb & Kolb, 2005, p. 194). We frequently attribute experience as our best teacher. Moreover, experiential learning enables teachers to feel and think directly based on reality and stimulates reflection. This reflection or by looking at back or the past, teachers can identify their difficulties and weaknesses. Experiential learning involves do, apply, and reflect (Norman & Jordan, n.d., p. 1). I find that experiencing ICT tends to be informal or need big percentage of learning outside classroom. The 21st century learning is indicated by moving from theory (abstraction) to experience (Beaudin & Quick, 1995, p. 2).

Social learning is the other learning process which is required during ICT implementation. Exploratory learning is very closely related to social learning. Learning new software can be confusing if it is learnt alone. This situation may encourage learners to seek for information, ask others to show how to do it and work collaboratively with others. ICT implementation requires informal social learning instead of just getting ICT training. The condition of social environment in these types of learning is very central. Teachers' behavior is

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not affected by self-dimension, but also environment (Zimmerman, 1989, p. 330). Moreover, the availability of community of practice or culture of sharing can enhance teachers' ICT learning.

Transformative learning should also be performed to ensure successful implementation on ICT. Apparently, the 21st century or digital era stimulates teachers to move from traditional pedagogy into constructivism by integrating ICT into their pedagogy. This stimulates teachers to transform. They need to change, experience new things, and reflect. ICT is transformative instrument (ETS, 2007). However, not all teachers are willing to change and accept ICT. This indicates that ICT as transformative tool will rely dormant until teachers are willing to use it. Thus, teachers' willingness to change is more essential than the ICT bloom. However, it may not easy to change teachers' perspective. They may intend to change when they feel good things about it (ICT). They can be more motivated to use ICT when they see their friends' experiences. Teachers will not accept change easily by altering their perspectives, but they can change their own selves after experience good things through their teaching practice (Guskey, 2002, p. 383). Transformative learning is not only requiring teachers to be ready to change, but also reflect on their teaching and learning practices (King, 2002). By performing transformative learning, learners can develop development is the heart of transformative learning (Merriam, 2004).

Adaptive learning and situated learning are the other central leaning, which are closely related to transformative learning. The coming ICT requires teachers to not only transform their traditional perspective into constructivist view, but also be ready to welcome the rapid changes of ICT elements. Frequently, older tools do not work anymore, it is not compatible anymore. Thus, it should be replaced with the modern (newer) one. Teachers should be adaptable to this situation. They should be adaptive to their changing environment, adapt the mode of interaction, how they should deliver their courses, how they find and synthesize materials and how they collaborate with others (Paramythis & Loid-Reisinger, 2004). Learning to implement ICT requires teachers to manage uncertainness, search for problem solving and prepare options for problem solving. Adaptive learning benefits learners in four ways: capable of handling irregularities, differences, joining diverse information and having chance for doing (Folke, et., al., 2003, cited in Davidson-Hunt & Berkes, 2003). Teachers should become "adaptive experts" and perform "responsive practice" (Darling-Hammond, 2006, pp. 10-11).

Situated learning is the other types of learning which is essential for integrating ICT. Adaptive learning needs active engagement with environment or being performed together with situated learning. Problems and challenges that teachers encounter during the process of learning can provide real learning context. Situated learning enables learners to get learning benefits from three dimensions: the context (including authentic context, activity, adopt multiple perspectives and being able to be expert by doing), process (including process of coaching and scaffolding, integrated assessment), and learner (including chances for collaboration and reflecting) (Herrington & Oliver, n.d.). During this situated learning, teachers can learn practical things. Moreover, they will be forced to find solution for their teaching problems.

Capacity to attach ICT into learning materials is required to put ICT integrated with other teaching method, without leaving/moving far away from curriculum. Teachers need to be creative with ICT. This does not mean that they should teach ICT separately, but they use ICT to support the delivery of other learning materials. This is also relevant to collateral learning. The collateral learning creates learners who are aware and learn from the context instead of the content only (Dewey, 1938, 1963, p. 48, cited in Allal, 2001, p. 407). This means that context is matter in learning ICT. This context includes physical environment, members, types of the group and group culture (Kirk, Brooker & Braiuka, 2000, p. 5). This learning is very closely related the social learning.

4.1.2 Challenges of Implementation

There are several skills that teachers should obtain and develop. Having up-to-date IT skills does not guarantee successful ICT implementation. Teachers should elaborate their IT skills with their capacities to perform integrative learning. They also should be able to not only develop their cognition to attain ICT skill, but also manage their affective and social

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learning. Those educational managements include identifying students; needs and interests, being open to new experience (change), possessing classroom sensitivity/awareness, classroom activity management, managing spaces and teaching method and delivery. Teachers also should have planning skill.

During the implementation of new introduced ICT and by interviewing my colleague, I find that there are several challenges that we encounter. These challenges can be grouped into three aspects: teacher factor, student aspect and environment challenges.

Teacher-self aspect: This aspect covers several "me" factors which impede the implementation and need to be managed. Those are:

a. Lack of exploration because too inhibited by feeling of being afraid of experiencing technical difficulties, especially if there is no help and happens in classroom.
b. Lack of planning. The multirole/task of teaching frequently hides the significant role of planning. When implementing ICT, I overly put attention on the technology operation.
c. No technical assistant in class. Frequently, we have to fight alone in class when there is sudden technical problem. In this situation, we frequently feel helpless and worry of being embarrass in class.
d. Rapid change of technology, including the coming and rapid up-dating of previous technology frequently surprise me and provide just short time to re-scanning the "newcomers," select and suit it with student's needs.

Student aspect: This aspect includes condition and behavior of students which I should be taken into account. Those are:

a. Technological discrepancy. Not all students have technology which can support their learning. They may have to borrow it from their friends or work with them.
b. Diverse competence and interest. Different students may have different skills, motivation, perspective and attitudes towards ICT in their learning.
c. Different capacity to be resilient. Learning by using ICT needs them to be competent in two aspects: their core content of learning and ICT. Some students may feel frustrated when they encounter problems in the area of ICT and this may affect their motivation to learn or to do assignments/tasks. Moreover, their frustration can also affect me. I frequently ask question to myself, is it good way of learning or any other better way?
d.

Environment aspect: This factor covers social and physical environment which may inhibit the ICT implementation. Those are:

a. No sharing culture. This situation forces me and my colleague to learn alone and independently, while at the same time feel helpless and unmotivated when there is no one to share experience, a person whom we can ask to.
b. The given training is not continued in classroom practice since it is too difficult to understand and the facility is frequently does not work.
c. Internet connection issue
d. inflexible classroom spaces
e. Rapid changes which need energy, time and focus. This brings about consequence of sometimes being exhausted and never finished things entirely.
f. Social pressures and the learning gap. Some people learn fast, while others learn more slowly.

Those factors indicate that ICT learning is not only the matter of understanding the technical operation, but there are several skills and attitudes, teachers should possess and demonstrate to work with ICT. Teachers should be open to new experience, being explorative, develop several some skills, including identifying students' needs and interest, classroom sensitivity, classroom awareness, classroom activity management, space management and teaching method. Teachers should actively engage in intertwined integrative learning process, including explorative learning, experiential, social, resilience, transformative, adaptive, situational, procedural and collateral learning.

4.2 Teachers' Self Study, Reflection and Professional Development: Looking at Learning Process Inward and Outward.

We cannot run out finding any training when we are in trouble using ICT. Frequently teachers should learn by themselves, learning from others, asking help from those who can use

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ICT. Teachers should continually process, construct and reconstruct themselves through learning. Classrooms, the teaching and learning field of teachers are always dynamics, changing. This is probably because of the changing perspective in education and development of environment (for instance ICT, curriculum). This should encourage teachers to keep touch with changes and leave their comfort zone. Frequently, these changes are contextual. Not all classrooms in all areas have similar problems. They are very practical and situational. This implies that different teachers may have different problems, needs and interest. Formal training on ICT content may not be sufficient to accommodate all of teachers' differences. Teachers should be encouraged to be self-directed learners, use their own self as learning human generators who can learn from their own-others experiences and social environment. In this situation, they do not have to wait external facilitation (training) to learn.

On the process to be self-directed learners, teachers may find self and social constraints. Self-barriers are coming from how teachers view themselves in relation to their professions and their own self (as human, tend to be separated from their professions). Our experiences show that self-motivation to follow changes and self-efficacy can be significant challenges. This self-efficacy and motivation affect teachers' readiness to learn.

> "I think information and technology is good media for learning. I mean it can improve learning efficiency and effectiveness. But, unfortunately, for me, generation which almost 60 year-old or over, we find bariers in learning ICT. What is the barrier? I see my self like an old car and as an old car, the engine is not powerful anymore. (a colleague perspective)

The excerpt shows that my colleague felt that he is old. This affects his self efficacy and motivation to learn ICT. I also experience similar feeling to my colleague, but in different ways. It is apparent that my colleague self-efficacy is obstructed by his perception on his incapacity relating to age, while my own efficacy is hindered by feeling the potential threat relating to my students: what if my students' IT competence is better than me? Will I feel embarrassed? What will my students think about me if in class I cannot operate certain technology?

The social constraints can also influence teachers' self-learning process. These constraints include what other people (social environment) says about teachers who have difficulty in learning ICT and how teachers perceive their social constraints, are they really barriers which tell teachers to stop learning? or inject teachers to learn more. The holistic ICT learning above indicates that to perform self-study, learners should also engage in social interaction. Bandura (2006, cited in Skaalvik & Skaalvik, 2007, p. 611) argues that there is dyad between person, behaviour and environment. This ICT learning though social learning generates some issues relating to teachers' self-study. Some of those constraints are what teachers should do when they are surrounded by unsupportive environment, what happens if teachers' social environment underestimates/isolates teachers who are slow in learning ICT and how teachers should behave/participate in social interaction to learn from others?

> "Recently, I have to learn technology as media to facilitate my teaching in classroom. I almost don't have motivation to develop my self because there is a clash between my self and my social environment. I become very lazy to use technology in class. But, gradually, my environment becomes better, conducive and harmonious and slowly I recover from depression which I feel for a long time..."
>
> (a colleague perspective)

ISSN: 2502-4124

The excerpt above shows that social environment exerts impact on teacher. Teachers motivation to learn can be eliminated/extinguished by social control and disharmony. This includes social underestimation, isolation, disapproval, dominance and social comparison to others' study or achievement. Since there is no clear parameter of success in independent ICT learning, teachers may observe how other teachers use ICT and compare to themselves.

programmes to take into account the dimension of teachers' self construction and self-study skills. Teachers training should orient to prepare teachers to be independent and social learners who can learn from their practical issues. It is expected that this type of teachers is able to shift what they get from practice into knowledge.

Figure 3 above represents self and social hindrances operating within teachers' self study in learning ICT.

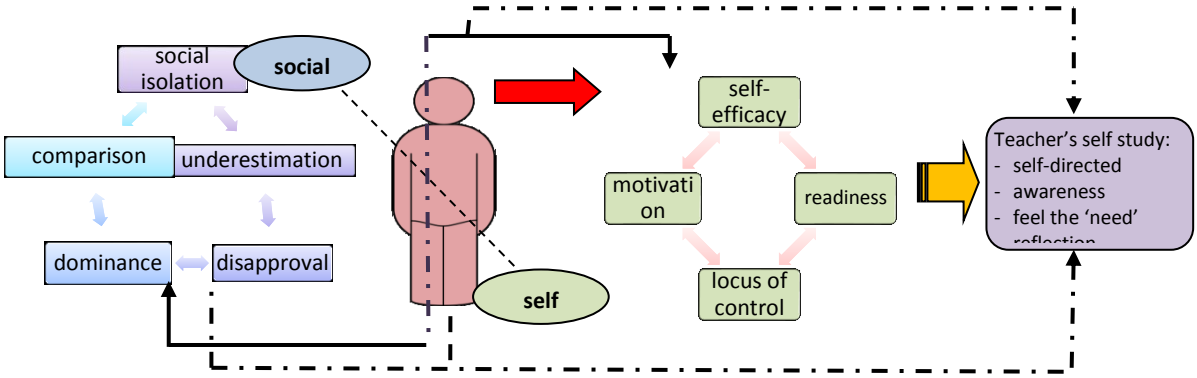

Figure 3. self and social hindrances operating within teachers' self-study

Teachers may feel stressful, are under considerable pressure or unmotivated when they know that they are left behind or sense competence gap between their ownselves and their colleagues. This indicates that social environment can have impact on teachers' self study.

4.3 Teacher Training and Education: Teachers' Selves Orientation

Training can be one of several ways for teachers to improve their self as human learners and as professional learners. However, frequently, training is directed or programmed for introducing certain (ICT) content, for example how to operate new software or implementation of new technology in classroom. Thus, it aims to build teachers' ICT cognition.

Many times teachers should learn independently since new waves of ICT come, but there is still no formal trainings come or they will not come. In this situation, teachers cannot wait training to develop themselves. They should take initiative to learn what they need. They should become self-regulated teachers. Thus, it is significant for any training

5. CONCLUSION

To encourage students to learn and develop themselves by using ICT requires teachers to lay the foundation of working with ICT. This process should be started from teachers' self, teachers' learning. This is because teachers are learning facilitators. To be able to facilitate successfully, they should learn and develop temselves. Teachers' development is closely related to the students' learning outcome. To be able to work with ICT, teachers should develop various skills surround the technical operation of ICT. Those skills include identifying what students need or interested in, sensing classroom or develop social awareness, managing activity and materials and managing spaces. Teachers also need to perform holistic integrative learning which include exploratory, experiential, social, resilience, transformative, adaptive, situated, procedural and collateral learnings. There are teacher, student and environment aspects which should be taken into account for working with ICT. Moreover, teachers should be able to learn from their experience since the situation can be vary from context to context. This indicates that

ISSN: 2502-4124

teachers should do self study. There are several social and self hindrances that teachers should face.

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